North American Emergency Response Guide
Instructor Guide

Session Reference: 1

Topic: North American Emergency Response Guide

Level of Instruction: 3

Time Required: 2-3 hours

Materials:
- **Chalkboard**
- **NAERG Books**
- **Placards or Placards Chart**
- **Slides of vehicles with placards found in your area**

References:
- **North American Emergency Response Guide Book**
- **Hazardous Materials for First Responders. IFSTA 2nd Edition**
- **MFRI Hazardous Materials Operations Program**

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PREPARATION:

Motivation:

The North American Emergency Response Guide Book is one that all emergency responders need to be familiar with. It is carried on every emergency vehicle in your department, and every call that you respond on (vehicle accident, building fire, or medical emergency) could require using it.

Objective (SPO): 1-1

The student will be able to identify from memory and without assistance, the four color sections of the North American Emergency Response Guidebook, and be able use it on a incident.

Overview:

Review of the Four Different Color Sections of the NAERG
- **Yellow Section of materials by Identification Numbers**
- **Blue Section of materials by Name**
- **Orange Section of Guides for dealing with material**
- **Green Section of Initial Isolation and Protective Action Distances**

Session 1 Using the NAERG Book

SPO 1-1 The student will be able to identify, from memory and without assistance, the sections in the NAERG book, and its use on a incident.

1-1 Describe the use of the four digit identification numbers used in the NAERG.

1-2 Describe the Yellow Section of the NAERG, how it is used to identify a material, and what guide to use to handle an incident dealing with the material.

1-3 Describe the Blue Section of the NAERG, how it is used to identify a material, and what guide to use to handle an incident dealing with the material.

1-4 Describe the Orange Section of the NAERG, the purpose of the guides in this section, and how to use it on an incident.

1-5 Identify the Green Section of the NAERG, the purpose of this section, and how to use it on an incident.

1-6 Using all the sections of the NAERG the student will be able to obtain information from the 2004 ERG necessary to assist in managing a hazardous materials incident.

Instructor Guide	Instructor Notes
I. Four Digit Identification Numbers (1-1)	
A. Purpose of Numbers	
1. Internationally developed numbers used so that a user can identify the material, no matter what language they speak.	
2. Developed by the United Nations for International use.	
B. Use of Numbering System.	**Refer to page 14 in the white pages, read through the description of the hazard classes. 1 DOT Chart 12 has been provided to each station.**
1. Using DOT Chart 12 of placards show the students how the numbering system is used to identify materials.	
2. Have the students identify 6 locations in their first due area that they could find placards used, and what type of business it is.	
II. Yellow Identification Section of Guide (1-2)	
A. Purpose of the Section	
1. Identifying hazardous materials by the four digit United Nations number on the placard or shipping papers.	
2. Identify the guide used for dealing with an incident that the number has identified.	
B. Using the Yellow Section of NAERG	
1. Materials listed by numerical order.	

(Approximately 3600 chemicals)

2. More then 1 chemical may have the same Identification number. (Example: 1203)

C. Activity for students.

1. Divide the crew/group in half and give each group 3-5 numbers to identify the chemical. (Examples: 1923, 2054, & 3027)

Other Examples: 3347, 3275, 3130, 2927, 2875, 2531, 1981, 1812

2. Give each group 5-10 minutes to identify the chemical, and report their findings to the other group.

III. Blue Identification Section of Guide (1-3)

A. Purpose of the Section

1. Identify the hazardous material by its proper name found on the shipping papers.

2. Identify the guide used for dealing with an incident that has the chemical name identified.

B. Using the Blue Section

1. Materials are listed alphabetically by proper chemical name. (Approximately 3600 chemicals)

2. Remind students that exact spelling of the chemical name is important. Many chemicals are spelled almost the same. (Examples: - Butylamine & N-Butylaniline.)

C. Activities for students.

1. Divide the crew/group in half and give each group 3-5

chemicals to identify using proper chemical names. (Give group at least 1 chemical name that is close to other groups.)

2. Give each group 3-5 minutes to identify the chemicals, and report their findings to the rest of the group.

Chemical name examples: Butylamine, Butylaniline, Chloronitrobenzene, Cesium, chromic acid - solid, dry ice, Dipentene, ethylmercaptan, poisonous liquid - flammable

IV. Orange Section of Guide (1-4)

A. Purpose of the Section.

1. Give the first responder on a hazardous materials incident, basic procedures for dealing with the incident.

2. Remind the student that the information is for only protective actions, and is very generic.

B. Using the Orange Section of NAERG

1. Divided into 62 different guides.

2. Each guide is used for more then one chemical.

3. Guides are also divided into groups dealing with specific categories of chemicals. (Examples guides 115-126 deals with compressed gases.)

C. Activity for students.

1. Divide the crew in half and give each group 3-5 I.D. numbers and chemical names, and identify the proper guide to use for each.

2. Give each group 3-5 minutes to identify the proper guide, and

Examples of names and numbers:

Carbon monoxide	1016
Caustic soda	1823
Consumer commodity	8000
ethyl alcohol	1170
explosive A	no #
fuel oil	1202
isobutane	1075
nitric acid	1660

report it to the group.

V. Green Section of Guide (1-5)

A. Purpose of the Section.

1. To identify suggested isolation zone for chemicals that are identified as toxic from vapors of the spilled chemical.

2. The Initial Isolation Zone is defined as the area surrounding the incident in which people may be exposed to dangerous (upwind) and life threatening (downwind) concentrations of the material.

B. This section also contains a list of water reactive materials, that when mixed with water will produce a large amount of toxic fumes.

C. Using the Green Section of NAERG

1. Remember, when any chemical is highlighted in the Yellow or Blue section, the green section of the Guide is used.

2. Chemicals are listed in U.N. number order in this section.

3. Review pages 298-299 in NAERG for determining out initial isolation and protective action distances.

D. Activity for students.

1. Divide the crew in half and give each group a chemical, and have them determine the proper isolation and protective actions distances for the chemical. (Both day & night conditions.)

Chemical examples:
Liquefied gas - poisonous,
Methyl isocyante,
ID # 3287
ID # 2188
ID # 2977

2. Give each group 5-10 minutes to develop their plan.

VI. Putting all the Sections Together (1-6)

A. Review each Section.

1. Yellow Section of Guide (by ID numbers)

2. Blue Section of Guide (by proper name)

3. Orange Section of Guide (actions to take)

4. Green Section of Guide (Isolation & Protection Action Guide.)

B. Activity for Students.

1. Divide the crew in half and give each group 3-5 chemicals to identify, and what actions they should take on a incident as a first responder.

2. At least one of the chemicals should be highlighted so that they must figure out an isolation, and protective action distances.

3. Give each group 15-20 minutes to complete their work and report back to the class.

4. Review the problems as a class, and discuss any questions or concerns.

Chemical examples:
Sulfuric acid – fuming
Arsenic Chloride
Benzene
Hydrogen Bromide
VX
ID # 's 3129
1076
2315
1075
1045

SUMMARY:

Review:

Review the Four Sections of the North American Emergency Response Guide

- **Yellow Section by Identification Numbers**
- **Blue Section by Proper Names**
- **Orange Section by Action Guides**
- **Green Section by Initial Isolation and Protection Action Distances**

Assignment: **Fill out training roster**
Turn in all group activity paper work
Complete the skills check list
Complete the following two worksheets

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Skills Check List

Name/ID: _____

Date: _____

Rig/Shift: _____

Captain Signature: _____

Check the appropriate area for completion:

	PASS	FAIL
Successfully completed review of the new 2004 ERG	_____	_____
Participated in and successfully completed the student activities	_____	_____
Accurately completed two worksheets	_____	_____
Developed the ability to use the 2004 ERG competently in hazardous materials training or emergency response	_____	_____

WORKSHEET # 1:

Define the following terms:

Flash Point:_____

Fire Point: _____

Boiling Point: _____

Vapor pressure :_____

Density :_____

Specific Gravity:_____

Flammable limits :

Upper Flammable limits:

Lower Flammable limits :

Solubility :

Four classes of Solubility:

WORKSHEET # 2:

Complete this worksheet identifying the properties of the following chemicals: Propane, Natural Gas, Gasoline, Diesel. Answers for this section can found on line @ the NIOSH website or an internet web search of the specific chemical.

Propane

Fire:_____

Explosion:_____

Physical State:_____

Physical Dangers:_____

Physical Properties:

Boiling Pt. _____ Melting pt. _____

Relative density – (water = 1:_____

Solubility in waterg/100ml at 20 C:_____

Vapor pressure, KPa @ 20 C: _____

Relative vapor density (air = 1): _____

Flash point: _____

Explosive limits, vol % in air: _____

Gasoline

Fire:_____

Explosion:_____

Physical State:_____

Physical Dangers:_____

Physical Properties:

Boiling Pt. _____ Melting pt. _____

Relative density – (water = 1:_____

Solubility in waterg/100ml at 20 C:_____

Vapor pressure, KPa @ 20 C: _____

Relative vapor density (air = 1): _____

Flash point: _____

Explosive limits, vol % in air: _____

Diesel, Fuel oil, kerosene

Fire:_____

Explosion:_____

Physical State:_____

Physical Dangers:_____

Physical Properties:

Boiling Pt. _____ Melting pt. _____

Relative density – (water = 1:_____

Solubility in waterg/100ml at 20 C:_____

Vapor pressure, KPa @ 20 C: _____

Relative vapor density (air = 1): _____

Flash point: _____

Explosive limits, vol % in air: _____

Natural Gas, liquefied natural gas, methane

Fire:_____

Explosion:_____

Physical State:_____

Physical Dangers:_____

Physical Properties:

Boiling Pt. _____ **Melting pt.** _____

Relative density – (water = 1:_____

Solubility in waterg/100ml at 20 C:_____

Vapor pressure, KPa @ 20 C: _____

Relative vapor density (air = 1): _____

Flash point: _____

Explosive limits, vol % in air: _____

ANSWER KEY

Propane

Fire: **Extremely Flammable**

Explosion: **Gas/air mixtures are explosives**

Physical state: **Odorless and colorless compressed liquefied gas**

Physical dangers: Gas heavier than air, can settle in low places

Exposure routes: inhalation and contact

Physical properties:

Boiling pt. - -42 C **Melting pt.- -189.7 C**

Relative density – (water = 1: 0.5)

Solubility in waterg/100ml at 20 C: .007

Vapor pressure, KPa @ 20 C: 840

Relative vapor density (air = 1): 1.6

Flash point: 104 C

Explosive limits, vol % in air: 2.1 – 9.5

Gasoline

Fire: Flammable

Explosion: Gas/air mixtures are explosives

Physical State: clear liquid with a visible odor

Physical Dangers: Occupational carcinogenic

Exposure routes: inhalation, skin absorption, ingestion, contact

Physical Properties:

Boiling Pt. 102 F Melting pt. na

Relative density – (water = 1: 60 F 0.72-0.76

Solubility in waterg/100ml at 20 C: insoluble

Vapor pressure, KPa @ 20 C: 30-300mmhg

Relative vapor density (air = 1): na

Flash point: -45 F

Explosive limits, vol % in air: UEL 7.6 LEL 1.4

Diesel (Fuel Oil, Kerosene)

Fire: Do not extinguish fire unless flow can be stopped.
Cool all affected containers from a distance.
Apply water from a distance

Explosion: combustible, keep ignition sources away form spill

Physical State: straw yellow to dark colored liquid with petroleum odor, vapors heavier than air.

Physical Dangers: May be ignited by strong oxidizers

Exposure: inhalation, ingestion, contact

Physical Properties:

Boiling Pt. 540 -640 F Melting pt. 0 F

Relative density – (water = 1: 0.841 @ 60.8 F

Solubility in waterg/100ml at 20 C: less than 1 @ 66 F

Vapor pressure, KPa @ 20 C: 2.17 mmhg @ 70 F

Relative vapor density (air = 1): heavier than air

Flash point: 125 F

Explosive limits, vol % in air: UEL 6.0%, LEL 1.3%

Natural Gas

Fire: combustible

Explosion: Explosive range is between 5 and 15 percent

Physical State: colorless, odorless gas

Physical Dangers: produced by anaerobic bacterial decomposition commonly occurring in nature, also known as Marsh Gas. Non detectable without an odorant. Not toxic but could cause asphyxiation in non ventilated areas

Physical Properties: mixture of methane, ethane, propane and butane

Boiling Pt. -164 C Melting pt. -183 C

Relative density – (water = 1: less dense than air

Solubility in waterg/100ml at 20 C: Not very soluble in water

Vapor pressure, KPa @ 20 C: stored at atmospheric pressure at -256F

Relative vapor density (air = 1): lighter than air

Flash point: -306F

Explosive limits, vol % in air: UEL 15 %, LEL 5 %

Answer Key

Flash Point – the lowest temperature at which a liquid can form an ignitable mixture in air near the surface of the liquid.

Fire Point – the temperature at which the flame becomes self sustained so as to continue burning the liquid at the flash point. The fire point is a few degrees above the flash point.

Boiling Point – the temperature at which a liquid changes to a gas at normal atmospheric pressure.

Vapor Pressure – the vapor pressure of a liquid is the pressure exerted by its vapor. (A liquid whose vapor pressure is greater than atmospheric pressure will eventually vaporize – turn to a gas.)

(Vapor pressure and Boiling are very closely related. The boiling point is the temperature at which the vapor pressure of the liquid equals the external pressure.)

Density – amount of something per unit of volume. Generally expressed as the mass per unit of volume for a solid or liquid.

Specific Gravity – is a ratio of the mass of a material to the mass of an equal volume of water at 39 degrees F. (Density and specific gravity have very similar but not quite identical definitions)

Flammable limits – generally apply to vapors and are defines as the concentration range in which a flammable substance can produce a fire or explosion when an ignition source is present.

Upper flammable limit – the concentration of a substance in air is to rich to burn. Often referred to as the Upper Explosive Limit.

Lower flammable limit – the concentration of a substance in air is to little or lean to burn. Often referred to as the Lower Explosive Limit.

Solubility – solubility of a substance is the maximum amount of a material that can be dissolved in a given quantity of solvent at a given temperature. Solubility's are broken into four classes: soluble, slightly soluble, sparingly soluble and insoluble.

Immiscible liquids are insoluble in each other. ie – oil & water
Miscible liquids form one homogenous liquid. ie methanol & water